11—PAVEMENT

11A. GENERAL

Conduct all Work necessary to meet the requirements of this Section 11 (Pavement) and satisfy all functional needs of the Project including pavement and associated items.

11B. STANDARDS

Complete Work for pavements in accordance with the requirements of the standards listed by priority in Table 11B-1 (Standards for Pavement).

TABLE 11B-1
STANDARDS FOR PAVEMENT

Priority	*Author or Agency*	*Title*
1	UDOT	Special Provisions included in Part 5
2	UDOT	*Supplemental Specifications to 2012 Standard Specifications for Road and Bridge Construction,* as modified by Part 5
3	UDOT	*2012 Standard Specifications for Road and Bridge Construction,* as modified by Part 5
4	UDOT	*Supplemental Drawings to 2012 Standard Drawings for Road and Bridge Construction*
5	UDOT	*2012 Standard Drawings for Road and Bridge Construction*
6	UDOT	*DARWin-ME 2012 (Pavement Design) Manual of Instruction*
7	UDOT	*Materials Manual of Instruction*
8	AASHTO	*A Policy on Geometric Design of Highways and Street*

11C. REQUIREMENTS

The Department has provided results from pavement investigation in Part 8 (Engineering Data).

Design and construct pavements that meet the following requirements:

A. The term "Pavement Section," is defined as the entire pavement structural section, including all structural layers (e.g., Portland Cement Concrete Pavement (PCCP), hot-mix asphalt (HMA), stone-matrix asphalt (SMA), additional wearing courses, base and sub-base materials) in any combination as defined by the pavement design.

B. All pavement designs shall be performed by a Professional Engineer licensed in the State of Utah who possesses at least 10 years of pavement design experience.

C. Mainline, ramps, and interchange cross streets shall be designed and constructed as jointed plain concrete pavement (JPCP) with load transfer bars.

1. All portions of SR-92 ramps south of the physical gore at the southbound off-ramp and northbound on-ramp shall be designed and constructed as HMA pavements.

D. The concrete pavement for the cross street at the 14600 South interchange shall extend to the east and west frontage roads adjacent to the interchange (Minuteman Drive and Pony Express Road). The PCCP pavement shall terminate at the inside of the curb returns at each frontage road.

E. Design all PCCP pavement sections to perform for not less than 40 years.

F. Design all HMA pavement sections to perform for not less than 20 years.

G. Design all pavement sections according to traffic volumes and vehicle classifications included in Part 8 (Engineering Data).

H. Design all pavements using the 2014 updated Utah calibration coefficients for the DarwinME pavement design software included in Part 8 (Engineering Data).

I. Design all pavement sections using Utah local calibration coefficients and all other recommended design inputs identified in the UDOT DARwin-ME 2012 *Pavement Design Manual,* with the following clarifications:

1. When employing level 3 design, existing PCCP can be classified as only "Fair" or below when selecting modulus values.

2. When employing level 3 design, existing HMA can be classified as only "Fair" or below.

3. Concrete aggregates shall be classified as Quartzite with a CTE of $5.79x10^{-6}$ inches/inches/degree F, unless Project-specific aggregate testing indicates a change.

4. Obtain Department Approval for all design inputs.

J. Provide a Pavement Design Report which includes all test data, design inputs, methodologies, assumptions, the resulting pavement sections, and related performance predictions.

K. Design pavement sections in accordance with the following parameters

1. Provide pavement sections to accommodate climatic conditions such as frost depth.

2. For base course drainage, collector systems, and outlets, follow guidelines in FHWA-RD-72-30.

3. Design pavement sections and elements that minimize rutting and shoving at transitions from one pavement type to another.

L. For mainline paving, the thickness of the PCCP shall be uniform across the entire width of the roadway, including shoulders.

M. For ramps, the thickness of the PCCP shall be uniform across the entire width of the roadway, including shoulders.

N. For cross-streets, the thickness of the PCCP shall be uniform across the entire width of the roadway, including shoulders.

O. For ramps and cross-streets, provide the following minimum pavement layer thicknesses (inches) or the thickness based on design calculations, whichever is greater.

TABLE 11C-1
MINIMUM PAVEMENT LAYER THICKNESS

	PCCP	HMA (HMA/SMA)
Ramps	9	
Cross Streets	9	6

P. Wherever possible, utilize the existing pavement section as a foundation/base for the new pavement by employing overlay techniques/strategies.

Q. When widening adjacent to an overlay, design the base courses of the widening to provide the same structural support as the adjacent pavement section being overlaid. Design shall include a treated base.

R. Overlays of existing flexible pavements are required whenever the existing pavement is widened or when re-striping is required due to lane shifts and/or transitions. The overlays shall be applied to the entire width of the pavement to provide a continuous and homogeneous riding surface.

For the purpose of this Section 11, overlays are defined as follows:

1. Structural HMA overlays: The final full-width overlay shall include the top HMA layer and SMA wearing course.

2. Surface treatment: The final full-width overlay shall include the SMA wearing course, or an alternative treatment Approved by the Department.

3. Unbonded PCCP overlays: A new PCCP overlaying an old/existing PCCP separated by a bond breaking layer.

4. Whitetopping: A new PCCP overlaying an existing HMA pavement.

S. Where whitetopping is used, mainline sections shall be designed as conventional unbonded PCCP incorporating the existing pavement as a stabilized base. Where the existing HMA is profile milled, the minimum thickness of the remaining HMA layer shall be 5 inches. The design thickness of the whitetopping pavement shall be based on the structural integrity and minimum thickness of the remaining pavement.

T. Prepare a deterministic life-cycle cost analysis for the pavement design and rehabilitation for both flexible and rigid pavements. Use the annualized cost method to determine life-cycle cost in terms of uniform annual cost (UAC). Use a 4 percent discount rate. Calculate user costs as outlined in the UDOT *Pavement Design Manual of Instruction*. Salvage value shall not be used. Use the maintenance/rehabilitation schedule shown below:

1. Flexible pavement (HMA with 1.5 inches of SMA wearing course):

10 years	SMA overlay
20 years	Mill & Fill (2.5 inches HMA+1.5 inches SMA)
30 years	SMA overlay
40 years	Reconstruct

2. PCCP:

20 years	Grind and Concrete pavement rehabilitation (CPR)
30 years	Concrete pavement rehabilitation
40 years	Reconstruct

U. Provide pavements with no identifiable distress (including blowups, faulting, cracking, scaling, pop-outs, spalling, surface texture defects, raveling, segregation, oily or slick spots, and edge slump) at Final Owner Acceptance; evaluate these distress parameters, in coordination with the Department, both during construction and at Substantial Completion; if corrective action needs to be taken, coordinate all such activities to minimize disruption of traffic and obtain Department Approval of the corrective actions.

11C-1 Ride Quality

Evaluate ride quality in accordance with Standard Specification, Section 01452, and Section 8-995 (Procedure for Certifying Profilographs/Profilers and Qualifying Profilograph Technicians).

11C-2 Surface Texture

Provide longitudinal tining as defined in Standard Specification, Section 02752.

11C-3 Temporary and/or Temporary Use Pavement

The Design-Builder shall be responsible for design, construction, and maintenance of all temporary pavements. Remove temporary pavement prior to Substantial Completion.

If existing shoulders that are to remain are used as temporary travel lanes to facilitate construction, provide in the Pavement Design Report a condition survey of the existing shoulders including photographs. The Pavement Design Report shall also include the anticipated duration for shoulder use, and demonstrate that the existing pavement is adequate to sustain the traffic loads without structural damage to the pavement. Repair or replace any damaged pavement.

11C-4 PCCP Paving Equipment

Provide an electronic monitoring device displaying the operating frequency of each internal vibrator.

A. Mount the readout display so that it is visible to both the paver operator and the Engineer.

B. Record clock time, date, location, paver track speed, and operating frequency of each individual vibrator at a minimum of every five minutes, or 25 feet, whichever is more frequent.

C. Submit daily electronic records to the IQF and the Department for the first five days of paving operations, and thereafter at a rate determined by the IQF and Approved by the Department.

11C-5 Repair of Defective Pavement

Replace any cracked, damaged, or otherwise defective pavement. Provide new full panels for any PCCP repairs/replacement.

11C-6 Permanent Pavement Markings

Water-based paint shall not be used. Meet the requirements of UDOT Standard Specification, Section 02768, with the following additional requirements:

A. Pavement markings shall be recessed (inlaid or grooved) into the surface to ensure that markings are below the surface to improve life by minimizing damage and wear.

B. Apply 2-inch black contrast markings on both sides of skip lines on PCCP.

C. Provide 8-inch wide dash stripes at all access zones between the express and general purpose lanes.

D. Temporary pavement markings shall be completely removed when no longer required and leave no visible scar.

11D. SUBMITTALS

Provide submittals to the Department in accordance with Table 11D-1.

TABLE 11D-1
DESIGN-BUILDER SUBMITTALS FOR PAVEMENT

Submittal	*For Approval*	*Schedule*
Pavement Design Report	No	Prior to NTP 2
Electronic record of vibrator operating frequencies	No	At time of paving operations per Section 11C-4